Journal of the Association for Information Systems

JAIS

Research Article

The Adoption of Online Shopping Assistants: Perceived Similarity as an Antecedent to Evaluative Beliefs*

Sameh Al-Natour
American University of Sharjah
salnatour@aus.edu

Izak Benbasat
University of British Columbia
izak.benbasat@sauder.ubc.ca

Ron Cenfetelli
University of British Columbia
ron.cenfetelli@sauder.ubc.ca

Abstract

In recent work, researchers have supplemented traditional IS adoption models with new constructs that capture users' relational, social, and emotional beliefs. These beliefs have given rise to questions regarding their antecedents and the nature of the user-artifact relationship. This paper sheds light on these questions by asserting that users perceive and respond to information technology (IT) artifacts as social partners and form perceptions about their social characteristics. Subsequently, users' perceptions of the similarity of these characteristics to their own affect evaluations of these artifacts. Within the context of online shopping and using an automated shopping assistant, our paper draws upon social psychology and human-computer interaction research in developing hypotheses regarding the effects of perceived personality similarity (PPS) and perceived decision process similarity (PDPS) on a number of beliefs (enjoyment, social presence, trust, ease of use, and usefulness). The results indicate that PDPS acts as an antecedent to these beliefs, while the effects of PPS are largely mediated by PDPS. Furthermore, the results reveal that the effects of perceived similarity, in general, exceed those of the effects of the individual assessments of the user's and the assistant's personalities and decision processes. These results have important implications for IS design. They highlight the importance of designing artifacts that can be matched to users' characteristics. They also underscore the importance of considering similarity perceptions rather than solely focusing on perceptions of the IT artifact's characteristics; a common approach in IS adoption research.

Keywords: *IT Diffusion and Adoption, User Acceptance of IT, Electronic Commerce, Decision Support Systems.*

* Dennis Galletta was the accepting senior editor. This article was submitted on 13th December 2009 and went through four revisions.

Volume 12, Issue 5, pp.347-374, May 2011

The Adoption of Online Shopping Assistants: Perceived Similarity as an Antecedent to Evaluative Beliefs

1. Introduction

Traditional models of information systems (IS) adoption, such as the Technology Acceptance Model (TAM; Davis, 1989), have focused on predicting adoption intentions and behavior using a set of cognitive beliefs (e.g., perceived usefulness, perceived ease of use). These typically address the utilitarian benefits users expect to achieve from using the system. Similarly, in the e-commerce context, researchers have initially adopted a utilitarian perspective, in which extrinsic cognitive beliefs are deemed as the sole salient beliefs determining the adoption of e-commerce information technology (IT) artifacts (e.g., websites, recommendation agents). In recent work, however, e-commerce researchers have argued that websites should be designed with the goal of building relationships and improving the online customer experience (Al-Natour & Benbasat, 2009). It has been suggested that a web-based interface is not merely a tool to support the transaction, but is the online company's "window to the world" (Benbasat, 2006), through which communication with customers takes place and relationships are built.

With this new focus, researchers have started supplementing traditional models of adoption with new types of behavioral beliefs that capture the relational and experiential aspects of the user-technology interaction. These new beliefs can be grouped into three categories: 1) social beliefs, 2) emotional beliefs, and 3) relational beliefs. Social beliefs address the social outcomes of using a system. An example includes social presence (Qiu & Benbasat, 2005). Emotional beliefs address the user's affective state while using the system. An example is perceived enjoyment (Venkatesh, 2000). Finally, relational beliefs concern the exchange aspects of the customer's interaction with the IT artifact, for example, trust (Wang & Benbasat, 2005).

Supplementing traditional models with these new beliefs has not been straightforward (Benbasat & Barki, 2007). Specifically, two new challenges emerge as a result of these attempts to add new social, emotional, and relational beliefs to existing adoption models. The first relates to the conceptualization of the proposed constructs, and the explication of the relationship between them and those that have been previously identified. To tackle this challenge, researchers have utilized some theoretical leeway afforded by reference theories supporting these adoption models. They have conceptualized these additional beliefs as behavioral beliefs influencing the attitude toward the adoption behavior (e.g., Taylor & Todd, 1995), or as antecedents to the original TAM beliefs (e.g., Venkatesh, 2000). The second challenge relates to the identification of antecedents for these constructs that can be tied to design characteristics (Benbasat & Zmud, 2003). In this vein, researchers have identified a number of beliefs about the system itself rather than the behavior of using it (termed *object-based* beliefs, Wixom & Todd, 2005). These object-based beliefs are proposed to influence the behavioral beliefs previously identified.

The research described in this paper complements these efforts. The primary objective of this study is to investigate the effects of an object-based belief, namely, *perceived similarity*, as an antecedent to cognitive (perceived usefulness and perceived ease of use), relational (trust), social (social presence), and emotional (perceived enjoyment).

The study builds on Al-Natour, Benbasat, and Cenfetelli (2006), who have shown that a user's independent self-assessments as well as assessments of an online decision aid's personality and decision-making strategy can interact to shape perceptions of personality and behavioral similarity. In this study, we focus on investigating the effects of these two types of similarity perceptions on users' evaluations of decision aids. Furthermore, we compare the effects of these perceived similarities with those of the *separate* assessments of the user's and the aid's personalities and decision strategies.

The remainder of this paper proceeds as follows: First, we offer a review of relevant literature from human-computer interaction (HCI) and social psychology. Next, we present our research model, and then describe our research method. Finally, we outline the results of our empirical investigation and offer a discussion of the results and contributions to research and theory.

2. Theoretical Foundations

Two streams of research are relevant to this study. First, the HCI literature provides support for the proposition that IT artifacts can manifest social and behavioral characteristics that are recognizable by their users. Second, literature from social psychology provides a theoretical foundation for how users are likely to process these perceptions of IT artifacts to form perceptions of their similarity to these artifacts.

2.1. Perceptions of Information Technology Artifacts as Social Actors

In addition to mediating social interactions among humans (e.g., email or group decision support systems), or acting as productivity tools that enhance users' performance, IT artifacts are perceived as social actors that can elicit social responses from their users (e.g., Al-Natour & Benbasat, 2009; Reeves & Nass, 1996). Under the Computers are Social Actors (CASA) paradigm (Nass, Moon, Fogg, Reeves, & Dryer, 1995), researchers have demonstrated that individuals perceive human-like characteristics (e.g., gender, personality types) on the part of IT artifacts, and apply social rules and expectations when interacting with them. These perceptions have been further shown to be processed in a manner similar to that in the context of *interpersonal interaction* (e.g., Nass, Steuer, Tauber, & Reeder, 1993). As a result, studies adopting this paradigm have: 1) investigated the types of social characteristics that could be manifested by IT artifacts and the conditions under which these manifestations are likely and 2) examined ways in which users process perceptions of these characteristics and the subsequent effects on their evaluations.

This study contributes to the second stream of research. Building on prior research demonstrating that users perceive that IT artifacts exhibit specific personality types and decision making strategies, we examine how similarity in terms of these characteristics affects users' evaluations. Second, we investigate the strength of these similarity effects vis-à-vis the effects of the user's independent self-assessments, and the assessments of the artifact's personality and behavioral characteristics.

2.2. The Similarity-Attraction Hypothesis

The similarity between interaction partners has been shown to be as consequential in the context of new encountersas it is in the context of sustained relationships (Huston & Levinger, 1978). The resultant *similarity-attraction* hypothesis, which postulates that people are attracted to others who are similar to them in terms of personal characteristics, is one of the most robust findings in social psychology (Byrne & Griffitt, 1969). Although support for this hypothesis has been found for demographic characteristics, academic interests, leisure activities, and values, most research has focused on attitude, behavior, and personality similarity (Morry, 2005). In addition to attraction, similarity has been shown to influence a variety of evaluative beliefs (e.g., perceived helpfulness; Pandey, 1978), behavioral intentions (e.g., desire for future interaction; Newcomb, 1961), and actual behavior (e.g., interaction depth; Duck, 1973a).

2.2.1. Explaining the Effects of Similarity

The primary models explaining the effects of similarity on evaluative beliefs can be roughly grouped under the label of reward-based models (Byrne & Griffitt, 1973). They propose that similarity has a positive effect on evaluations because it possesses reward qualities, and not because of any inherent characteristics per se (Pandey, 1978). Within this group of models, researchers have offered alternative explanations for why similarity is rewarding. For example, while Byrne, Griffitt, and Stefaniak (1967) suggest that similarity is rewarding because one's views are validated, others have proposed that similarity has more direct effects, such as increasing interaction enjoyment or reducing uncertainty about others. As a result, three main reward-based explanations are often discussed in the literature (Baxter & West, 2003; Morry, 2005): 1) effectance-arousal, 2) uncertainty reduction, and 3) pleasurable and enjoyable interactions.

The *effectance-arousal* model, the most general of the three, posits that positive and negative reinforcers (including information about similarity/dissimilarity) serve as stimuli for affective responses. Specifically, the model proposes that because attitudes lack objective verification, individuals look to others for validation (e.g., Byrne et al., 1967). Since similarity has reinforcement properties, it, therefore, offers the reward of validation. Clore and Byrne (1974) elaborated on this model and

suggested that any stimulus with reinforcement properties, such as similarity, triggers an implicit affective response. The latter serves as a mediator for evaluative responses, such as attraction, or subsequent similarity evaluations (Clore & Byrne, 1974)[1].

The second explanation, the *uncertainty reduction* model, proposes that similarity offers the reward of decreasing uncertainty about a target individual (Berger & Calabrese, 1975). This affords interaction partners predictability and enables them to communicate with greater confidence and effectiveness (Baxter & West, 2003). Berger and Calabrese (1975) propose that as dissimilarity between persons increases, uncertainty in terms of the number of alternative explanations for the dissimilar behavior or attitude also increases (i.e., the evaluator generates more causal attributions). On the other hand, when an evaluator is faced with a similar behavior or attitude, this similarity reduces the necessity for the generation of a large number of alternative explanations.

The third theoretical explanation arose out of early criticisms of Byrne et al.'s (1967) effectance-arousal model. Critics argued that similarity has another more direct effect by creating pleasurable and enjoyable interactions (e.g., Berscheid & Walster, 1978; Werner & Parmelee, 1979), facilitated by increased communication ease and reduced potential for conflict. The pleasurable-interactions explanation has been extended to include similarities in cognitive and communication style (Burleson & Denton, 1992).

While these three reward-based explanations agree in their general premise that similarity is rewarding, they differ greatly in their underlying mechanisms. More specifically, while the effectance-arousal explanation is general, in that it proposes that similarity evokes affective responses that come to be associated with the target individual regardless of any contextual factors surrounding the interaction, the uncertainty-reduction explanation proposes a clear *cognitive* process that follows when others are perceived to be similar. In contrast, the enjoyable-interactions explanation focuses instead on the effects of similarity on improving the quality of interactions (and thus, the evaluator's experience), in what has been termed the "rewards of interaction" interpretation (Davis, 1981). We propose that these explanations jointly provide the basis for linking different types of similarity evaluations to different types of evaluative beliefs.

2.2.2. Assessing the Similarity between Two Interaction Partners

Similarity can be assessed in two different ways. *Perceived similarity*, which is captured in this study, is measured by directly asking the evaluator to assess her similarity to a target on any number of dimensions. Alternatively, *dyadic similarity* is computed through matching each member of the dyad's characteristics on any similarity dimensions.

The use of perceived measures of similarity can be traced back at least as far as Allport (1937), who observed, "similarity is *personal*" (p. 283, emphasis in the original). Various theories in personality and social psychology emphasize the link between peoples' interpretations of their environment and their behavior. Allport first recognized that an individual's personal characteristics make different patterns of contextual stimuli "functionally equivalent" (Allport, 1937), arguing that attributes of people influence how they perceive and interpret social situations. As a result, researchers started to view similarity as a *perception* held by the evaluator, rather than an objective comparison of characteristics (Werner & Parmelee, 1979).

Alternatively, *dyadic* similarity measures adopt what has been termed the "doctrine of identical elements" (Allport, 1937, p. 298), which equates similarity with the number of elements that are shared. This perspective assumes the existence of "some basic modes of adjustment that from individual to individual are approximately the same" (Allport, 1937, p. 298). It tends to better reflect the level of similarity that exists in reality, because people may not be fully aware of their similarity to others or the effects of this similarity on their behavior.

[1] The model proposes that any stimulus with reinforcement properties, such as similarity, functions as an unconditioned stimulus for an implicit affective response, where the reinforcement properties of stimuli are defined independently of the situation, or the capacity to alter response probability. Any discriminable stimulus, including a person, which is temporally associated with the unconditioned stimulus, can then become a conditioned stimulus capable of evoking the implicit affective response (Byrne & Griffitt, 1973).

Not surprisingly, perceived similarity has been shown to be more predictive of subsequent evaluative responses (e.g., Duck, 1973b; Werner & Parmelee, 1979), especially in the formation stage of a relationship (Furr & Funder, 2004). This is because, first, personal characteristics influence how people perceive and interpret similarity stimuli, and second, because accurate estimates of actual similarity often require deep knowledge of others (Hoyle, 1993).

In summary, given the stronger connection between perceptions of similarity and subsequent evaluations, this study examines the effects of similarity, assessed under the perceived similarity paradigm, on users' evaluations of online decision aids. Al-Natour et al. (2006) showed how dyadic similarity can predict perceived similarity.

3. Research Model

The research model is shown in Figure 1. This study investigates the effects of perceived similarity on users' evaluations of shopping assistants that perform the dual role of a tutor educating customers about product attributes and a recommender system offering recommendations based on predefined criteria. Because the norm is to define similarity based on one or a small group of characteristics that are discriminable to the evaluator (Byrne et al., 1967), this study examines the effects of *two* types of perceived similarity, namely, *Perceived Personality Similarity (PPS)* and *Perceived Decision Process Similarity (PDPS)*. We propose that these are most salient within the context of interacting with an online shopping assistant.

Perceived personality similarity refers to users' *perceptions* of the similarity between their personality characteristics and those of the assistant's. Perceived decision process similarity, on the other hand, refers to users' perceptions of the similarity between their decision-making process and that of the assistant's. Since the relationships among the different evaluative beliefs (social, relational, emotional, and cognitive beliefs) have been previously validated (e.g., Davis, 1989; Gefen & Straub, 2003; Venkatesh, 2000; Wang & Benbasat, 2005), our analysis is limited to investigating the effects of the perceived similarity constructs on these beliefs.

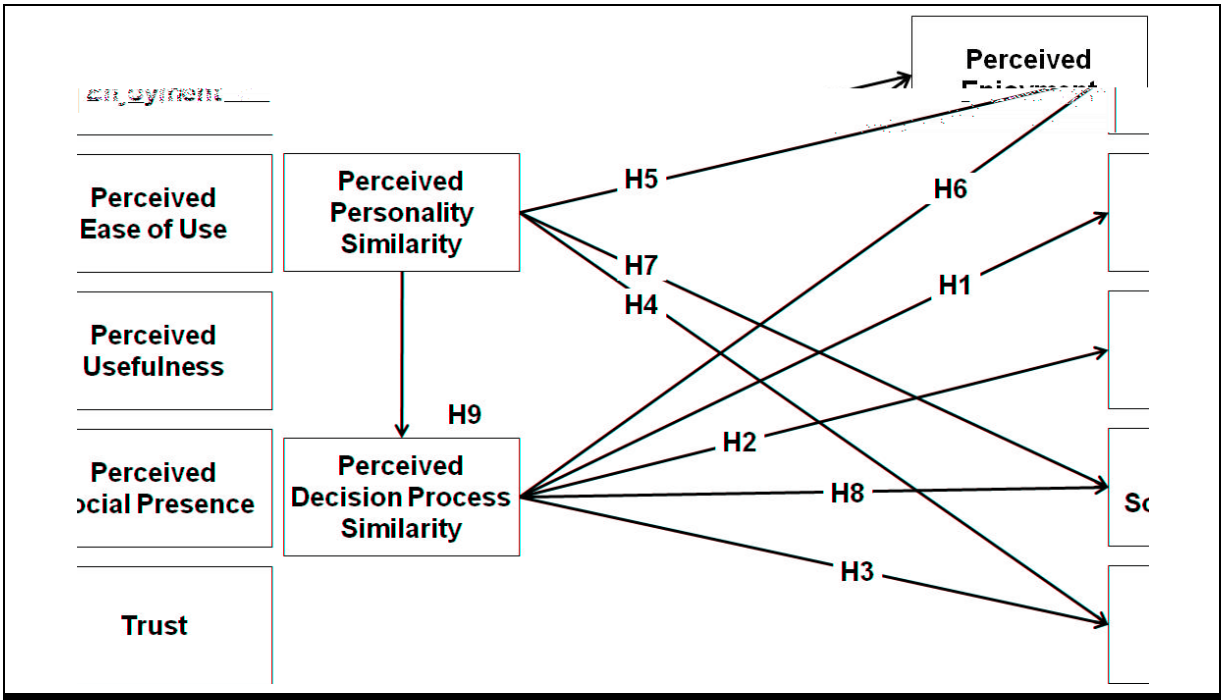

Figure 1. Research Model

3.1. The Effects of Perceived Similarity

As discussed earlier, to study users' interactions with IT artifacts, researchers have used a number of beliefs that are not limited to evaluating the artifact as a productivity tool, but also as a social partner. Thus, in evaluating the artifact, the user is, in fact, evaluating both the experience of interacting with it and the tool itself. Consequently, the five behavioral beliefs considered in this study can be divided into three main categories: 1) those that strictly address the experiential aspects of the interaction (social presence, perceived enjoyment), 2) those that focus on the utilitarian outcomes of the interaction (perceived usefulness), and 3) those that relate aspects of the interaction experience to the utilitarian outcomes of the interaction (e.g., trust, perceived ease of use). For example, while perceived enjoyment is a belief about the emotional outcomes of the behavior of interacting with the artifact that does not address any of the utilitarian outcomes of that interaction, perceived usefulness strictly addresses the utilitarian outcomes of the behavior of interacting with the artifact. Alternatively, both trust and perceived ease of use are beliefs concerning the experience of interacting with the artifact relative to the utilitarian outcomes of that interaction. More specifically, trust is not an evaluation of the artifact's trustworthiness, in general, but rather its trustworthiness in regard to achieving specific goals (e.g., the shopping assistant is competent in choosing the right product). Similarly, perceived ease of use, albeit a cognitive type belief, is not a characteristic of the artifact, per se, but rather an evaluation of an aspect of interacting with the artifact to achieve a specific goal (e.g., I find it easy to get the shopping assistant to do what I want it to do).

Likewise, we propose that the two object-based beliefs (the two perceived similarities) examined in this study can be similarly categorized. Because the assistant's personality is unlikely to affect perceptions of the utilitarian outcomes, but rather the experience of interacting with it, we propose that the effects of PPS will be limited to evaluative beliefs that address aspects of the interaction experience (i.e., perceived enjoyment, social presence, and aspects of trust that relate to the experience). Alternatively, because the assistant's decision process affects both the experience of interacting with it and the outcomes of this interaction, we propose that the effects of PDPS will extend to evaluative beliefs addressing aspects of the interaction experience (i.e., perceived enjoyment, social presence, and the experiential components of perceived ease of use and trust), and those addressing its outcomes (i.e., perceived usefulness and the experiential components of perceived ease of use and trust).

In what follows, we offer a detailed discussion of the hypothesized effects of the two similarity constructs, highlighting how they can exert influence on evaluative beliefs. This is accomplished by describing how the different mechanisms explaining the effects of similarity can allow for the prediction of unique effects on evaluations of the interaction experience, the interaction outcomes, or both.

3.1.1. Similarity as an Uncertainty-Reduction Stimulus

Three types of uncertainty underlie users' interactions with an online shopping assistant. First, users may experience a level of uncertainty about how to use the assistant to achieve a certain goal (e.g., choose a product). This type of uncertainty, we believe, is closely related to the perceived ease of use construct. The latter refers to the degree to which a user believes that using a particular system will be free of effort (Davis 1989). Lower levels of uncertainty about how to use the assistant are likely to increase perceptions of its ease of use. In this study, we propose that PDPS will act as an uncertainty-reduction stimulus that lowers this type of uncertainty. Specifically, similarity in terms of the decision process will allow for better understanding of the assistant's actions. This allows the user to infer how to respond appropriately, as well as know what to do to get the assistant to perform certain actions. Furthermore, when the assistant uses a decision process similar to the user's, the user will likely require less cognitive effort to understand the assistant's behaviors. These two factors of increased understanding and lower cognitive effort will lead to higher perceptions of ease of use.

***H1**: PDPS will increase the assistant's perceived ease of use.*

A second type of uncertainty relates to what the assistant is doing and how. This uncertainty is expected to affect users' ability to correctly judge whether they are receiving benefits from the interaction, and whether more benefits can be gained if the assistant performs its function differently.

Hence, this uncertainty, which concerns the utilitarian aspects of the interaction, can affect perceptions of the assistant's usefulness. The latter refers to the degree to which a user believes that using a particular system will enhance his or her performance (Davis, 1989).

In the context of interacting with a shopping assistant, the similarity between the assistant's decision process and the user's will not only allow the user to better understand the decision-relevant behaviors of the assistant, but will also ensure that much of the information, the arguments presented, and explanations provided by the assistant are relevant to the user's own behaviors and method of reasoning. This will allow users who use a similar decision process to receive more benefits from their interaction with the assistant (Nass et al., 1995).

***H2**: PDPS will increase the assistant's perceived usefulness.*

A third type of uncertainty is a direct result of the information asymmetry underlying the agency relationship between the user and the shopping assistant. It concerns whether the assistant is performing the task delegated to it solely for the benefit of the user. A high level of this uncertainty in agency-type relationships increases the need for trust between the principal and the agent (Wang & Benbasat, 2005).

In general, similarity has been shown to enhance feelings of trust (Levin et al., 2002; Zuckers, 1986). For example, Lichtenthal and Tellefsen (2001) have shown that buyers often judge their degree of similarity with a salesperson in terms of observable characteristics (tangible characteristics manifested through non-verbal cues such as physical attractiveness, gender, ethnicity) and internal characteristics (intangible characteristics manifested through verbal cues such as perceptions, attitudes, and values). They conclude that while internal similarity can increase a buyer's willingness to trust a salesperson and follow her guidance, observable similarity often exerts a negligible influence on a buyer's perceptions of a salesperson's effectiveness. This conclusion was echoed by Levin et al. (2002), who found that benevolence-based and competence-based trust were more affected by malleable relational features (e.g., shared language and shared vision) than stable and visible features such as demographic similarity. Others have shown that similarity encourages perceptions of others as in-group members, which serves as a catalyst for increased interpersonal trust and bypasses the need for personal knowledge (Brewer, 1981). Hence, one tends to perceive in-group members to be more trustworthy, in what is termed as identification-based trust (Brewer, 1996).

In this study, we hypothesize that decision process similarity will give rise to feelings of trust in the assistant for two main reasons. First, as discussed earlier, one of the consequences of the similarity between the assistant's and the user's decision processes is that the user will be in a position to better understand and evaluate the assistant's decision process and its reasoning. Thus, decision process similarity allows for the development of trust-relevant knowledge. The latter allows the user to more accurately judge whether the assistant is performing its task competently (competence dimension of trust), whether the assistant is performing that task solely for the benefit of the user (benevolence dimension of trust), and whether the assistant is adhering to principles that are acceptable to the user (integrity dimension of trust). Thus, trust-relevant knowledge enables the user to evaluate the assistant's competence, benevolence and integrity – the dimensions of trusting beliefs identified by McKnight, Choudhury, and Kacmar (2002). In so doing, PDPS forms the basis for the development of knowledge-based trust that reduces the effects of information asymmetry.

Second, decision process similarity has more direct effects on the three dimensions of trust. Given the ubiquity of self-positivity biases that affect individuals' assessments of their own abilities (e.g., above-average effect; Dunning, Meyerowitz & Holzberg, 1989), an assistant that is perceived to have a similar process will also likely be perceived as competent. Furthermore, the perception that the assistant is using a similar process biases the user to believe that the assistant cares that she understands its reasoning, and therefore, will be perceived as more benevolent. Finally, using the same decision process will likely encourage the user to assume that the assistant shares her world-view, thus adhering to a set of principles that are acceptable to the user.

***H3**: PDPS will increase the assistant's perceived trustworthiness.*

PPS, on the other hand, reduces the uncertainty regarding the assistant's interpersonal aspects, rather than those directly relating to the utilitarian aspects of the relationship. First, we propose that perceptions of high personality similarity will facilitate the formation of identification-based trust (Brewer, 1996), through encouraging perceptions of the assistant as an in-group member that understands and shares the user's world-view. We propose that this affects users' perceptions of the assistant's benevolence and integrity (which include large affective components; Levin et al., 2002). Second, similarity in terms of personality dimensions that concern individual differences in social behavior will ensure a higher level of shared language between the user and the assistant. Research has shown that people with shared language may feel a closer bond with one another and be more trusting in terms of benevolence (Levin et al., 2002). Furthermore, shared language can enhance perceptions of the competence of others because they use the same jargon, while lowering chances of a misunderstanding (Dougherty, 1992).

***H4**: PPS will increase the assistant's perceived trustworthiness.*

3.1.2. Similarity as a Pleasurable-Interactions Stimulus

In addition to having the reward of decreased uncertainty, similarity can make interactions more rewarding by improving their quality (Davis, 1981). This includes making them more enjoyable through increasing the ease of communication and reducing the potential for conflict (Berscheid & Walster, 1978; Werner & Parmelee, 1979). Therefore, we expect that similarity can further influence the *Perceived Enjoyment (PE)* of the interaction between the user and the shopping assistant. PE is an affective belief that refers to the extent to which the activity of using the system is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated (Davis, Bagozzi, & Warshaw, 1992).

In this study, we propose that both types of perceived similarity will have positive effects on perceived enjoyment, each for a distinct reason. PPS is expected to result in more interaction enjoyment because personality similarity facilitates better communication. On the other hand, while decision process similarity ensures that the potential for conflict is reduced, decision process dissimilarity increases it. This conflict can be manifested via an explicit disagreement between the user and the assistant, or simply through a conflict within the user's cognition that makes the interaction more cognitively demanding.

***H5**: PPS will increase perceived interaction enjoyment.*
***H6**: PDPS will increase perceived interaction enjoyment.*

3.1.3. Similarity as an Effectance-Arousal Stimulus

The effectance-arousal model for explaining the effects of similarity asserts that because similarity is reinforcing, it offers the reward of self-validation. Consequently, people will be conditioned to look favorably on sources of these positive reinforcements, and thus, similar others. While the uncertainty-reduction or the rewards-of-interaction explanations have been credited for proposing more specific and contextually-relevant mechanisms for the effects of certain types of similarity on evaluative beliefs (Burleson & Denton, 1992), the generality of the effectance-arousal model is most beneficial. While other explanations inherently draw a connection between certain types of similarities and types of evaluative responses, the effectance-arousal model allows us to explain the effects of similarity on evaluations that do not directly relate to the similarity dimension under study. Consequently, we believe that the effectance-arousal model can be used to explain all the effects that we have thus far hypothesized, as well as predict additional effects of perceived similarity, namely, on social presence.

Social Presence (SP) refers to the feeling of "being with another" (Biocca, Harms, & Burgoon, 2003), and was traditionally used to measure the degree to which a medium allows its users to establish personal connections with other people in distant locations (Short, Williams, & Christie, 1976). Recently, however, social presence was extended to the domain of artificial representations of humanoid intelligence, such as virtual human agents (Qiu & Benbasat, 2005) and websites (Gefen & Straub, 2003). In such contexts, social presence refers to the extent to which an artifact is perceived as sociable, warm, personal, or intimate when *interacting* with it (Gefen & Straub, 2003).

Consistent with the effectance-arousal model, we propose that perceived similarity, in terms of both personality and decision process, will function as a reinforcement stimulus that evokes an unconditioned affective response, which subsequently becomes associated with the similar shopping assistant and the behavior of interacting with it. Thus, perceptions of similarity on either one of the two dimensions will share the common effect of shaping perceptions of interacting with the assistant more positively, because it becomes to be associated with the affective response that the similarity perceptions have evoked.

While the effectance-arousal model does not restrict the type of possible evaluative responses, we believe it to be most suitable to predicting evaluative beliefs that are general in nature, and which relate to general assessments of the quality of the interaction and the interaction partner. It is unlikely that evaluators will associate an affective response evoked via similarity to an evaluation of a specific specialized characteristic of the target, but will rather associate it to general characteristics that are salient within the context under which the affective response has been evoked (Pandey, 1978). Therefore, we believe that evaluations of social presence will be affected by similarity through an effectance-arousal mechanism.[2]

Furthermore, we also propose a second role for the affective response that is evoked through similarity, and which was highlighted in a similar study by Lee and Nass (2003). In addition to its role in directly affecting evaluations of the assistant associated with that affective response, we further propose that the arousal ensuing from the affective response will result in increased and focused attention (Berscheid & Walster, 1978; Lee & Nass, 2003). This focused and selective attention should allow the user to more clearly discern and distinguish the human-like characteristics manifested by the shopping assistant (Lee & Nass, 2003). This increases the user's perceptions of the assistant's humanness, and thus, its social presence.

***H7**: PPS will increase the assistant's perceived social presence.*
***H8**: PDPS will increase the assistant's perceived social presence.*

3.2. The Relationship Between the Different Similarity Types

In addition to acting as an antecedent to a number of evaluative beliefs, perceived similarity on one dimension can act as an antecedent to subsequent similarity evaluations (Clore & Byrne, 1974). In this regard, research has shown that individuals will likely use evaluations of similarity on one dimension in their evaluations of similarity on a different, yet related dimension (Byrne et al., 1967), especially when the latter concerns more specialized and specific characteristics (Duck, 1973a). Adopting a reinforcement-type perspective, it has been argued that people look for validation of different sorts of cognitions at different points in the history of relationships. In the early stages of an acquaintance, people look to have more peripheral aspects of themselves validated by others, and thus, are more likely to screen others based on easily available information about their general characteristics (Duck, 1973a). As the acquaintance process progresses, however, concern shifts to obtaining validation for more fundamental aspects of oneself (Burleson & Denton, 1992).

In this study, we propose that the perception of personality similarity will act as an antecedent to the perception of process similarity. The direction of this proposed causality is justified for three main reasons. First, personality similarity evaluations are typically possible at an earlier stage of the interaction, while decision process similarity evaluations require an in-depth knowledge of the target's decision process. Second, personality similarity evaluations are less specialized, and thus, used in later evaluations of similarity that are based on the more specialized criteria of decision process (Duck, 1973a). Third, given that the assistant's personality and subsequent evaluations of its similarity largely address the communication issues between the user and the assistant, their effects on evaluative beliefs will be contextualized by anchoring them within the goals of the interaction. In other words, the effects of the assistant's personality and its similarity on evaluative beliefs will partially depend on whether that similarity is, in fact, improving the instrumental aspects of that interaction (e.g., the decision-making component). Thus, we believe that the effects of personality similarity will be mediated by perceptions of process similarity.

***H9**: PDPS will mediate the effects of PPS on evaluative beliefs.*

[2] The effects of similarity on social presence can also be explained via the rewards of interaction explanation (Davis, 1981).

3.3. Similarity Effects Relative to Artifact and User Characteristics

Similarity is a relationship-level construct that inherently involves an evaluation of the fit between the evaluator's characteristics and those of the target individual. The similarity-attraction hypothesis implies that similarity is more important and predictive of subsequent evaluations than the independent assessment of the target's characteristics. In this study, this implies that PPS and PDPS are more predictive of subsequent evaluations than the independent assessments of the user's and the assistant's personalities and decision processes. This proposition has been previously confirmed within the context of interpersonal interaction (Levin et al., 2002).

The implications of the similarity-attraction hypothesis stand in clear contrast to the general doctrine underlining much of IS research; more of the "right stuff" encourages better evaluations (Fichman, 2004). While it may be true that focusing on improving the artifact's characteristics by increasing the amount of the "right stuff" will facilitate the design of artifacts that are better in terms of absolute values, the similarity-attraction hypothesis suggests that these artifacts are evaluated less positively than those that match the artifact's characteristics to those of its users. For example, while extant research has shown that certain decision-making strategies allow for better decision outcomes (e.g., Bettman, Luce, & Payne, 1998), the similarity perspective asserts that any evaluation of a system will be largely determined by the fit of that strategy with that of the user, regardless of its type, or absolute goodness.

Needless to say, adopting a similarity perspective allows us to generate and explain relationships that cannot be explained by exclusively focusing on the artifact's or the user's characteristics. For example, while the effects of a certain decision strategy on perceived enjoyment cannot be easily rationalized, this same relationship can be easily justified through adopting a similarity perspective.

> ***H10 (a)****: PPS will exert stronger influences on evaluative beliefs than the separate assessments of the assistant's and the user's personalities.*
> ***H10 (b)****: PDPS will exert stronger influences on evaluative beliefs than the separate assessments of the assistant's and the user's decision processes.*

4. Research Method

4.1. Study Settings and Procedures

Subjects performed an online shopping task for a laptop computer. A shopping assistant was available to help and guide them through the shopping task. Subjects were randomly assigned to interact with one of 16 assistants that differed in terms of their personality, decision strategy, gender, and whether they communicated with users through text or voice (modality). Since subjects' preferences for laptops could vary, they were instructed to choose a laptop for a friend, and a description of the friend and his computer needs was provided. Before making a choice, the shopping assistant provided subjects with information about product attributes, one attribute at a time. Subjects then chose a laptop, and subsequently were presented with the assistant's recommendation. The treatment website offered six laptop alternatives that varied by 11 attributes (price, processor, operating system, memory, display, hard drive, CD/DVD-ROM, warranty, battery, networking cards, and weight).

4.2. The Treatment Conditions

To create adequate levels of variance in the perceived similarity measures, the assistants differed in their level of dominance, and in their use of decision rules associated with different types of decision-making strategies. A complete description of the experimental setup and treatment conditions is available in Appendix A.

Of the Big Five personality dimensions (Norman, 1963), two, namely, extroversion and agreeableness, have been argued to be most relevant to the context of social interactions, since they concern individual differences in social behavior (McCrae & Costa, 1989). In fact, researchers have developed a two-dimensional circumplex of interpersonal behavior that corresponds with extroversion and agreeableness

(Wiggins & Pincus, 1989). The extroversion factor is commonly referred to as the *power* factor, and its common rotation *dominance* ranges from dominance to submissiveness. The agreeableness factor is referred to as the *affiliation* factor, and its common rotation *friendliness* ranges from friendly to cold (Wiggins & Pincus, 1989).

This study focuses on the dominance dimension because it was judged to be more relevant to the role of decision support aids as tools to influence customers' decisions.[3] More specifically, dominance concerns individuals' tendencies to make decisions in dyads or groups, and how they communicate these decisions to others (Kiesler, 1983). Following Al-Natour et al. (2006), dominance was manifested by the shopping assistant by varying the degrees of its decisional guidance (Silver, 1990), use of directive speech acts (Searle, 1969), and expression of confidence.

With respect to the decision process, this study focuses on the decision-making strategy because it closely relates to the role of a shopping assistant as a recommender system. The shopping assistants differed in terms of the decision-making strategies they used, which were manifested through the explanations they provided to users (Wang & Benbasat, 2007). They either used a normative-based or a heuristic-based strategy.

In order to increase the generalizability of the results, the chosen sites offered shopping assistants of both genders that communicated either through text or voice. In all cases, the shopping assistants were represented by *naturalistic* 2D avatars, which are humanoid in form, but have degraded levels of detail.

4.3. Measures

Upon completion of the shopping task, subjects were directed to an online questionnaire that asked them to evaluate the shopping assistant in terms of trust, perceived enjoyment, ease of use, social presence, and usefulness. The measures used were adapted from previously established scales, and are shown in Appendix B.

Furthermore, subjects completed two newly-developed Likert-type scales that measured PPS and PDPS. The two scales are similar in their structure to those used by Crosby, Evans, and Deborah (1990) to measure appearance and status similarity between dyads. The PPS scale was adapted from the dominance scale in the Revised Interpersonal Adjectives Scales (IAS-R; Wiggins, Trapnell, & Phillips, 1988). The IAS-R is an adjectival measure of the circumplex of personality dimensions that has been shown to be a reliable and a valid measure of personality types. Subjects used the original IAS-R dominance scale to assess their own and the assistant's level of dominance. The adapted scale to measure PPS asked subjects to compare themselves to the assistant based on each of the traits listed.

Subjects were also asked to assess their own, as well as the assistant's decision-making strategy. The scale was developed based on the criteria distinguishing the different decision-making strategies proposed by Bettman et al. (1998). The PDPS scale asked subjects to compare their decision strategy to that used by the assistant. Finally, subjects were asked to answer several demographics questions and a 4-item scale measuring their product knowledge.

4.4. Participants

Subjects were 181 e-commerce shoppers recruited from a nationwide panel provided by a marketing research firm. An invitation to participate in the study was broadcast via electronic mail to members of the panel. Individuals were provided with a point-based incentive for their assistance in the study redeemable for various prizes available through the marketing firm. The average age of subjects was 40. Ninety-one were males and 90 were females. Subjects made, on average, 13 online purchases in the last 12 months, and 46 percent of subjects had at least a Bachelor's degree, while 48 percent had a household income of $45,000 or more. On average, subjects had a mean score of 4 and a standard deviation of 1.49 on the 7-point product domain expertise scale.

[3] In a similar decision-making task, Nass et al. (1995) showed that users' perceptions of the dominance of a computer interface do not interact with their perceptions of its friendliness. Only similarity along the dominance dimension affected users' evaluations of the computer interface.

5. Results

5.1. Manipulation Checks

The subjects' perceptions of the shopping assistant's dominance was used to verify that the personality treatment was effective. Overall, the dominant shopping assistant was perceived to be more dominant ($M = 4.20$ vs. 3.53, $F(1,179) = 19.81$, $p < 0.01$) than the submissive assistant. Subjects' self-assessed level of dominance did not differ across the two treatment groups ($F(1,179) = 0.19$, $p = 0.66$).

We recoded the last three items in the decision strategy scale. These three items measured the use of heuristic-based rules. Together with the three items measuring the use of normative-based rules, we created a single six-item bipolar scale that measured decision strategy along a continuum ranging from completely heuristic to completely normative. The decision strategy treatment was successful. Subjects' perceptions of the extent to which the shopping assistant used a normative strategy were higher in the condition where normative decision rules were used to explain the recommendations ($M = 4.73$ vs. 3.77, $F(1,179) = 34.96$, $p < 0.01$).[4] Subjects' self-assessed decision strategies did not differ across the treatment groups ($F(1,179) = 0.08$, $p = 0.78$).

Based on the 181 responses received, PPS and PDPS scores ranged from 1 to 7 with means of 4.67 and 4.34 and variances of 1.64 and 1.86, respectively. Overall, the treatment shopping assistants were able to create adequate levels of variation in the similarity beliefs to test the research model.

5.2. Measurement Model

To determine item-construct loadings, we conducted a factor analysis using Partial Least Squares (PLS) with PLS Graph 3.0 (Chin, 2001). Standardized loadings, means, and standard deviations for all items are shown in Appendix B. All loadings were high and statistically significant. We used the loadings for computing the internal consistency statistics and assessing the measurement model. In Table 1, the diagonal elements represent the square root of the average variance extracted (AVE). A rule for assessing discriminant validity requires that the square root of AVE is larger than the correlations between constructs, i.e., the off-diagonal elements in Table 1 (Barclay, Thompson, & Higgins, 1995). All constructs met the discriminant validity requirement. Another criterion for adequate discriminant validity requires the loadings of indicators on their respective latent variables to be higher than the loadings of other indicators on these latent variables, and the loadings of these indicators on other latent variables. The construct-item correlation matrix in Appendix C demonstrates adequate discriminant validity. Composite reliability estimates, reported in Table 1, were all above the suggested minimum of 0.70 (Fornell & Larcker, 1981).

Table 1. Measurement Model

	CR*	PE	PU	PEU	SP	TR	DS	PS	PK
Perceived Enjoyment (PE)	**0.93**	**0.87**†							
Perceived Usefulness (PU)	**0.97**	0.77	**0.94**						
Perceived Ease of Use (PEU)	**0.86**	0.58	0.58	**0.79**					
Social Presence (SP)	**0.96**	0.67	0.67	0.56	**0.91**				
Trust (TR)	**0.92**	0.62	0.66	0.57	0.63	**0.86**			
Decision Process Similarity (DS)	**0.94**	0.41	0.48	0.41	0.42	0.42	**0.91**		
Personality Similarity (PS)	**0.97**	0.27	0.20	0.30	0.21	0.30	0.55	**0.91**	
Product Knowledge (PK)	**0.95**	-0.16	-0.31	-0.12	-0.14	-0.16	-0.02	0.18	**0.91**

* Composite reliability (CR) is a measure of scale reliability that estimates the total amount of true score variance in relation to the total scale score variance.
† Diagonal elements represent the square root of the average variance extracted (AVE). AVE measures the amount of variance captured by the measures of a construct in relation to error variance of those items.

[4] ANOCOVA results indicated that both gender and modality did not have any significant effects on perceptions of the assistant's dominance or decision strategy.

5.3. Structural Model

We performed an analysis of the full model in Figure 1 using PLS with the two perceived measures of similarity acting as exogenous variables. Subjects' product domain knowledge was used as a control variable for usefulness and trust (Komiak & Benbasat, 2006), while the communication modality (whether the assistant communicated through voice or text) was used to control for the effects on social presence (Qiu & Benbasat, 2005). The assistant's gender and the match between its recommendation and the user's choice (outcome match) were used as control variables for all endogenous variables.

When the model was first analyzed, gender was shown to be a nonsignificant control variable, while outcome match had a significant effect only on trust. As a result, the model was reanalyzed excluding the insignificant control relationships, namely the effects of gender on all exogenous variables and the effects of outcome match on all the exogenous variables except trust. The results of the final model are shown in Figure 2.

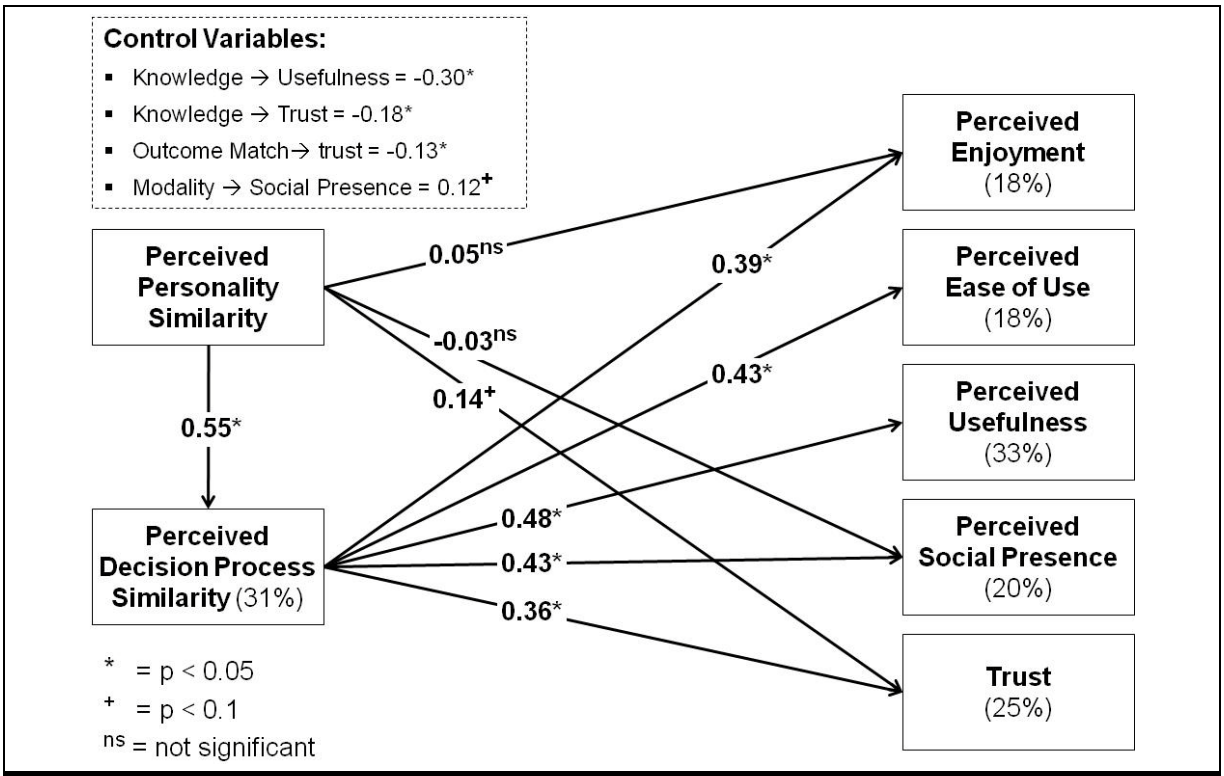

Figure 2. Structural Model Results

The results indicated that while Hypotheses 1, 2, 3, 6, 8, and 9 were supported, Hypotheses 5 and 7 had no support, and Hypothesis 4 had only marginal support. The hypotheses and their level of support are summarized in Table 2.

Perceived personality similarity had insignificant effects on perceived enjoyment and perceived social presence ($\beta = 0.05$, $p > 0.1$; $\beta = -0.03$, $p > 0.1$, respectively), and a marginally significant effect on trust ($\beta = 0.14$, $p < 0.10$). Perceived decision process similarity had positive and significant effects on perceived usefulness ($\beta = 0.48$, $p < 0.01$), perceived ease of use ($\beta = 0.43$, $p < 0.01$), trust ($\beta = 0.41$, $p < 0.01$), perceived enjoyment ($\beta = 0.39$, $p < 0.01$), and social presence ($\beta = 0.43$, $p < 0.01$). Together, PPS and PDPS explained 18 percent of the variance in perceived enjoyment, 20 percent of the variance in social presence, and 25 percent of the variance in trust. PDPS explained 33 percent of the variance in perceived usefulness and 18 percent in perceived ease of use.

Table 2. Summary of the Hypotheses and their Support

#	Hypothesis Statement	Support
1	PDPS will increase the assistant's perceived ease of use.	Yes
2	PDPS will increase the assistant's perceived usefulness.	Yes
3	PDPS will increase the assistant's perceived trustworthiness.	Yes
4	PPS will increase the assistant's perceived trustworthiness.	Partially
5	PPS will increase perceived interaction enjoyment.	No
6	PDPS will increase perceived interaction enjoyment.	Yes
7	PPS will increase the assistant's perceived social presence.	No
8	PDPS will increase the assistant's perceived social presence.	Yes
9	PDPS will mediate the effects of PPS on evaluative beliefs.	Yes
10 (a)	PPS will exert stronger influences on evaluative beliefs than the separate assessments of the assistant's and the user's personalities.	Yes
10 (b)	PDPS will exert stronger influences on evaluative beliefs than the separate assessments of the assistant's and the user's decision processes.	Yes

PPS had a positive and significant effect on PDPS ($\beta = 0.55$, $p < 0.01$), explaining 31 percent of its variance. To test whether PDPS mediates the effects of PPS on evaluative beliefs, we performed two separate mediation analyses. In the first, we performed three separate Sobel tests (Sobel, 1982) using the Aroian test equation (Baron & Kenny, 1986). The results reveal that PDPS is a significant mediator of PPS's effects on perceived enjoyment ($z = 4.45$, $p< 0.01$, total effect = 0.27, mediated effect = 0.21), social presence ($z = 4.80$, $p< 0.01$, total effect = 0.21, mediated effect = 0.24), and trust ($z = 4.45$, $p < 0.01$, total effect = 0.31, mediated effect = 0.20).

We performed additional mediation analyses using the bootstrapping technique proposed by Preacher and Hayes (2004). Unlike the Sobel test, this technique does not assume that the sampling distribution of an indirect effect is symmetric, and instead estimates it through bootstrapping. For hypothesis testing, the null hypothesis of no indirect effect is rejected at the level of significance for which zero lies outside the confidence interval (Preacher & Hayes, 2004). We performed three sets of bootstraps, each with 2,000 resamples. The bootstrap results showed that the indirect effects of PPS on perceived enjoyment, social presence, and trust were different from zero with 99 percent confidence. Thus, Hypothesis 9 was supported. Reversing the causal link between PPS and PDPS revealed that PPS is not a significant mediator of the effects of PDPS on the different evaluative beliefs, regardless of whether the Sobel test or the Preacher and Hayes technique was used. This strengthens the support for the proposed causality between these two constructs.

5.4. The Effects of Perceived Similarity Relative to the Independent Assessments

To compare the effects of the similarity constructs with those of the independent assessments of the user's and the assistant's personalities and decision strategies, we analyzed two additional structural models. First, we analyzed a model in which PPS acted, together with the customer's assessment of her own and the assistant's personality, as three separate antecedents to perceived enjoyment, social presence, and trust. The Beta coefficients from this model are shown in Table 3 (a). The three independent variables jointly explained 10 percent of the variance in perceived enjoyment and social presence, and 17 percent of the variance in trust. PPS had positive and significant effects on perceived enjoyment and trust. In contrast, neither of the independent assessments of the subject's or the assistant's personalities had significant effects on any of the dependent variables, thus, supporting Hypothesis 10 (a).

Second, we analyzed another model in which PDPS, together with the subject's perceptions of her and the assistant's decision strategies acted as three separate antecedents to perceived ease of use, perceived usefulness, perceived enjoyment, social presence, and trust. The results are shown in

Table 3 (b). The three independent variables jointly explained 26 percent of the variance in perceived ease of use, 31 percent of the variance in perceived usefulness, 28 percent of the variance in social presence, and 27 percent of the variance in perceived enjoyment and trust. PDPS had positive and significant effects on perceived ease of use, perceived usefulness, perceived enjoyment, social presence, and trust, which were consistently larger than those of the separate decision process assessments, thus, supporting Hypothesis 10 (b).

Table 3 (a). Personality Similarity vs. Subject's and Assistant's Personalities

	Assistant's Personality	Subject's Personality	Personality Similarity	Combined R^2
Effects on Perceived Enjoyment	0.15	-0.14	0.23*	10%
Effects on Social Presence	0.24	-0.04	0.13	10%
Effects on Trust	0.24	-0.22	0.26*	17%
* $p < 0.05$				

Table 3 (b). Strategy Similarity vs. Subject's and Assistant's Strategies

	Assistant's Strategy	Subject's Strategy	Strategy Similarity	Combined R^2
Effects on Perceived Ease of Use	0.13	0.24*	0.36*	26%
Effects on Perceived Usefulness	0.26*	0.07	0.44*	31%
Effects on Perceived Enjoyment	0.29*	0.12	0.36*	27%
Effects on Social Presence	0.22*	0.20*	0.36*	28%
Effects on Trust	0.14*	0.22*	0.38*	27%
* $p < 0.05$				

6. Discussion

6.1. Discussion of the Results

New e-commerce IT artifacts are increasingly being endowed with interactive characteristics, humanoid representations, and the ability to communicate using varying levels of modality. In so doing, these artifacts are also being endowed with the ability to manifest specific personality types and behavioral patterns, which can be recognized by their users and evaluated for their similarity to self.

The results of this study support that perceived similarity is an important antecedent to online customers' perceptions of a shopping assistant's usefulness, ease of use, social presence, trustworthiness, and the level of interaction enjoyment -- a set of beliefs that act as mediators for the effects of perceived similarity on reuse intentions. The lack of support for the effects of PPS on perceived enjoyment and trust warrants consideration. As evidenced by the mediation analyses, PPS's effects on perceived enjoyment and trust are largely mediated by PDPS. These results are not surprising considering the many findings asserting that individuals tend to evaluate others on a progressively more specialized and specific set of criteria as a relationship develops (Berger & Calabrese, 1975; Duck, 1973a). Personality-based similarity evaluations are typically expected to be most influential in earlier stages of a relationship, and more specifically, when information about personality is the sole information available to the evaluator (Byrne et al., 1967; Burleson & Denton, 1992). However, when information that pertains to deeper characteristics becomes available, either as a result of deeper interactions or relationship maturity, it becomes the primary basis for making similarity evaluations, where perceived similarity based on surface characteristics can affect subsequent evaluations of similarity (Clore & Byrne, 1974).

Not surprisingly, PDPS was found to exert significant and substantial effects on these beliefs that address aspects of the interaction experience, as well as the utilitarian outcomes of that interaction. While the effects of PDPS on outcome-based beliefs might be expected, its effects on the experience-

based beliefs affirm that the decision process does in fact relate in a significant way, through similarity evaluations, to the type of interaction experience users have with an IT artifact.

The finding concerning the relative predictive power of similarity perceptions when compared to users' perceptions of the artifact's and their own characteristics is most interesting. With the exception of PPS' effects on perceived social presence, the effects of perceived similarity on evaluative beliefs were larger in magnitude than those exerted by any of the independent assessments. The individual effects of the independent assessments of the user's and the assistant's personalities and decision strategies varied significantly. In general, the assistant's strategy was shown to be an influential predictor of a number of evaluative beliefs. This corroborates much of past research on the effects of the decision strategy followed by an agent on evaluative beliefs. The significance of some of the effects of the assistant's strategy indicates that users' characteristics are not to be ignored, but rather, these effects can help to further improve these evaluations.

6.2. Contributions to Theory and Research

The present study contributes to existing adoption research in three ways. First, this study identifies a set of antecedents for each of the four types of beliefs (social, relational, emotional, and cognitive), which were shown to be instrumental in predicting user adoption and use of IT artifacts. As a number of IS researchers have commented (e.g., Benbasat & Zmud, 2003), the identification of antecedents to evaluative beliefs that can be effected by design is a valuable contribution.

Second, this study complements studies conducted within the CASA paradigm by, first, investigating the effects of a previously unstudied behaviorally-based dimension of similarity (i.e., decision process similarity), and second, by examining the effects of perceived similarity, and thus, explicitly highlighting the role of users' processing of these characteristics for similarity.

Finally, this study affirms both the relevance and significance of the similarity approach to the study of IS adoption. Similar to early research in social psychology, IS adoption research has traditionally followed an individualistic approach to studying user-artifact interactions, where perceptions of the artifact's or the user's characteristics have been used as independent predictors of evaluative beliefs. As a result, studies have consistently provided evidence of deterministic relationships between these characteristics and evaluative beliefs. The similarity perspective allows us to shift our focus and research emphasis from simply examining the effects of some of the artifact's characteristics, to how these characteristics are evaluated relative to the user's own. As the results highlight, a consideration of the effects of perceived similarity is important to the advancement of research focusing on understanding users' evaluation of IS and their adoption decisions.

6.3. Practical Implications

As our results indicate, a decision aid that shares similarities with the user will be more positively evaluated and more likely to be adopted. Hence, tools to personalize decision aids should be extended to account for the potential effects of similarity. *Personalization* is the process of providing special treatment to repeat visitors by providing information and applications that are matched to the visitors' interests and needs (Kumar & Benbasat, 2006; Komiak & Benbasat, 2006). We propose that personalization mechanisms should be extended to take into account relevant customer characteristics, and consequently, personalize the message content, the communication style, and the behavior of the artifact to better suit each customer's personality and behaviors. For instance, answers to just a few questions can rapidly classify users as dominant or submissive. Consequently, the verbal and non-verbal cues manifested by a decision aid can be customized to better suit those of the user. In the case of repeat users, data mining techniques can be used to infer customers' behavior and attitude preferences.

On the other hand, designing for similarity can also have some unintended negative effects. It is likely that decision aids that are similar to their users will serve to reinforce current user behavior.[5] Such aids may make product assessments more efficient, but will be less likely to change or improve underlying processes, such as the many decision biases novice users are likely to experience (Arnold, Collier, Leech, & Sutton,

[5] The authors would like to thank one of the anonymous reviewers for suggesting this point.

2004).

The results regarding the effects of perceived similarity vis-à-vis the independent assessments can offer some solutions to this problem, as well as present a number of interesting challenges for practitioners. The positive effects of an aid's use of a normative strategy on its evaluations indicates that decision aids should be designed to use, or at minimum, manifest the use of a normative strategy. As proposed in this study, a particular decision strategy can be manifested via the explanations provided by a decision aid. When combined with the results of similarity, we can conclude that an aid that uses a normative strategy and is *perceived* to be similar by the user will be most positively evaluated. Therefore, in addition to designing similar and normative aids, designers will need to think of new ways that will either encourage users to employ normative decision strategies, or alternatively, enhance *perceptions* of an aid's similarity. As discussed in this paper and elsewhere, *perceptions* of similarity, as opposed to dyadic similarity, are likely to be influenced by a number of factors. As our results attest, perceptions of decision strategy similarity are strengthened by believing that the two personalities are similar. Other means for enhancing perceptions of decision strategy similarity will likely depend on the decision context, but include the extent to which the user is familiar with the decision outcome (Al-Natour, Benbasat, & Cenfetelli, 2008).

6.4. Limitations, Future Research and Extensions

While the generalizability of this study is enhanced by the use of real-life e-commerce shoppers, conducting the study outside the laboratory environment may strengthen its external validity at the expense of its internal validity. Another important limitation is the study's focus on only one type of e-commerce IT artifact that required the users and the assistant to work cooperatively. Some of the study's results may be specific to the nature of the interaction, such as the relative importance and salience of the individual similarity perceptions. For example, the design of the shopping assistant and the task used in this study ensured that enough personality and behavioral cues were manifested. Other artifacts, designs, or tasks may only allow for a subset of these cues, or possibly a different set of cues, to be manifested by the IT artifact.

Future research could be directed toward investigating the role of the artifact's design attributes in manifesting different social characteristics. Specifically, future research needs to answer the question of how exactly we should design IT artifacts so that customers perceive a certain personality or behavior. Potentially, a large number of design choices could give rise to a multitude of social perceptions. For example, it is possible that upper-class customers will be attracted to shopping assistants exhibiting sophisticated personalities, a phenomenon that has been observed in the physical store environment. Such traits can be cued through varying the textual content (e.g., use of ostentatious words), physical representation (e.g., dressy clothes), or even choosing a voice that is charming and likeable.

The degree to which perceptions of similarity affect actual behavior (e.g., buying) remains an open question. For example, does perceived similarity affect customers' initial choices or the likelihood of purchasing accessorial products? Does decision process similarity ensure that a user can realize better task performance? Answers to such questions will have serious implications for the way online stores advertise and recommend products and accessories, as well as design their shopping assistants.

7. Conclusion

This study had two main objectives. First, it investigated the role of two perceived similarities in affecting customers' evaluations of an IT artifact, in the form of a shopping assistant. Interestingly, while the results revealed that both types of perceived similarity are important antecedents to a number of evaluative beliefs, it was clear that while decision process similarity exerts direct effects on these beliefs, the effects of personality similarity were largely mediated. While much of the research conducted on the effects of similarity in relation to computer interfaces was limited to testing one type of similarity or another, this study sheds light on the relative importance of different types of similarity. Second, the study investigated the relative importance of similarity perceptions, when compared to perceptions of the artifact's and the user's characteristics. The results showed that perceptions of similarity are more significant predictors of evaluative beliefs than perceptions of the artifact's or the user's characteristics.

References

Al-Natour, S., & Benbasat, I. (2009). The adoption and use of IT artifacts: A new interaction-centric model for the study of user-artifact relationships. *Journal of the Association for Information Systems, 10*(9), 661-685.

Al-Natour, S., Benbasat, I., & Cenfetelli, R. (2008). The effects of process and outcome similarity on users' evaluations of decision aids. *Decision Sciences, 39*(2), 175-211.

Al-Natour, S., Benbasat, I., & Cenfetelli, R. (2006). The role of design characteristics in shaping perceptions of similarity: The case of online shopping assistants. *Journal of the Association for Information Systems, 7*(12), 821-861.

Allport, G. W. (1937). *Personality: A psychological interpretation*. New York, NY: H. Holt.

Arnold, V., Collier, P. A., Leech, S. A., & Sutton, S. (2004). Impact of intelligent decision aids on expert and novice decision-makers' judgments. *Accounting and Finance, 44*(1), 1-26.

Barclay, D., Thompson, R., & Higgins, C. (1995). The partial least squares (PLS) approach to causal modeling: Personal computer adoption and use an illustration. *Technology Studies, 2*(2), 285-309.

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic and statistical considerations. *Journal of Personality and Social Psychology, 51*(6), 1173-1182.

Baxter, L. A., & West, L. (2003). Couple perceptions of their similarities and differences: A dialectical perspective. *Journal of Social and Personal Relationships, 20*(4), 491-514.

Benbasat, I. (2006). Human-computer interaction for electronic commerce: A program of studies to improve the communication between customers and online stores. In P. Zhang & D. Galletta (Eds.), *Human-computer interaction and management information systems: Applications* (pp. 17-28). Armonk, NY: M.E. Sharpe.

Benbasat, I., & Barki, H. (2007). Quo vadis TAM. *Journal of the Association for Information Systems, 8*(4), 211-218.

Benbasat, I., & Zmud, R. W. (2003). The identity crisis within the IS discipline: Defining and communicating the discipline's core properties. *MIS Quarterly, 27*(2), 183-194.

Berger, C. R., & Calabrese, R. J. (1975). Some explorations in initial interaction and beyond: Toward a developmental theory of interpersonal communication. *Human Communication Research, 1*(2), 99-112.

Berscheid, E., & Walster, E. (1978). *Interpersonal attraction (2nd ed.)*. Reading, MA: Addison-Wesley.

Bettman, J. R., Luce, M. F., & Payne, J. W. (1998). Constructive consumer choice processes. *The Journal of Consumer Research, 25*(3), 187-217.

Biocca, F., Harms, C., & Burgoon, J.K. (2003). Toward a more robust theory and measure of social presence: Review and suggested criteria. *Presence: Teleoperators and Virtual Environments, 12*(5), 456-480.

Brewer, M.B. (1981). Ethnocentrism and its role in interpersonal trust. In M.B. Brewer & B.E. Collins (Eds.), *Scientific inquiry and the social sciences* (pp. 345-359). New York, NY: Jossey-Bass.

Brewer, M.B. (1996). In-group favoritism: The subtle side of intergroup discrimination. In D.M. Messick & A. Tenbrunsel (Eds.), *Codes of conduct: Behavioral research and business ethics* (pp. 160-171). New York, NY: Russell Sage Found.

Burleson, B. R., & Denton, W. H. (1992). A new look at similarity and attraction in marriage: Similarities in social-cognitive and communication skills as predictors of attraction and satisfaction. *Communication Monographs, 59*(3), 268-287.

Byrne, D., & Griffitt, W. (1969). Similarity and awareness of similarity of personality characteristic determinants of attraction. *Journal of Experimental Research in Personality, 3*(3), 179-186.

Byrne, D., & Griffitt, W. (1973). Interpersonal attraction. *Annual Review of Psychology, 24*, 317-336.

Byrne, D., Griffitt, W., & Stefaniak, D. (1967). Attraction and similarity of personality characteristics. *Journal of Personality and Social Psychology, 5*(1), 82-90.

Chin, W. W. (2001). PLS-graph manual, version 3.0. *Unpublished*.

Clore, G. L., & Byrne, D. (1974). A reinforcement-affect model of attraction. In T. L. Huston (Ed.), *Foundations of interpersonal attraction* (pp. 143-165). New York , NY: Academic Press.

Crosby, L. A., Evans, K. R., & Deborah, C. (1990). Relationship quality in services selling: An interpersonal influence perspective. *Journal of Marketing, 54*(3), 68-81.

Davis, D. (1981). Implications for interaction versus effectance as mediators of the similarity attraction relationship. *Journal of Experimental Social Psychology, 17*(1), 96–117.
Davis, F. D., Bagozzi, R., & Warshaw, P. (1992). Extrinsic and intrinsic motivation to use computers in the workplace. *Journal of Applied Social Psychology, 22*(14), 1111-1132.
Davis, F.D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly, 13*(3), 319-340.
Dougherty, D. (1992). Interpretive barriers to successful product innovation in large firms. *Organization Science, 3*(2), 179-202.
Duck, S. W. (1973a). Personality similarity and friendship choice: Similarity of what, when? *Journal of Personality, 41*(4), 543-558.
Duck, S. W. (1973b). Similarity and perceived similarity of personal constructs as influences on friendship choice. *British Journal of Social and Clinical Psychology, 12*(1), 1-6.
Dunning, D., Meyerowitz, J. A., & Holzberg, A. D. (1989). Ambiguity and self-evaluation: The role of idiosyncratic trait definitions in self-serving assessments of ability. *Journal of Personality and Social Psychology, 57*(6), 1082-1090.
Fichman, R. G. (2004). Going beyond the dominant paradigm for information technology innovation research: Emerging concepts and methods. *Journal of the Association for Information Systems, 5*(8), 314-355.
Fornell, C., & Larcker, V. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39-50.
Furr, R. M., & Funder, D. C. (2004). Situational similarity and behavioral consistency: Subjective, objective, variable-centered, and person-centered approaches. *Journal of Research in Personality, 38*(5), 421-447.
Gefen, D., & Straub, D. (2003). Managing user trust in B2C e-services. *e-Service Journal, 2*(2), 7-24.
Hoyle, R. H. (1993). Interpersonal attraction in the absence of explicit attitudinal information. *Social Cognition, 11*(3), 309-320.
Huston, T. L., & Levinger, G. (1978). Interpersonal attraction and relationships. *Annual Review of Psychology, 29*, 115-156.
Kiesler, D. J. (1983). The 1982 interpersonal circle: A taxonomy for complementarity in human transactions. *Psychological Review, 90*(3), 185-214.
Komiak, S., & Benbasat, I. (2006). The effects of internalization and familiarity on trust and use of recommendation agents. *MIS Quarterly, 30*(4), 941-960.
Kumar, N., & Benbasat, I. (2006). Research note: The influence of recommendations and consumer reviews on evaluations of websites. *Information Systems Research, 17*(4), 425-439.
Lee, K. M., & Nass, C. (2003). Designing social presence of social actors in human computer interaction. *Proceedings of the International CHI Conference*, Ft. Lauderdale, FL.
Levin, D. Z., Cross, R., & Abrams, L. C. (2002). *Why should I trust you? Predictors of interpersonal trust in a knowledge transfer context*. Paper presented at the 2002 Academy of Management meeting, Denver, Colorado.
Lichtenthal, J. D., & Tellefsen, T. (2001). Toward a theory of business buyer-seller similarity. *Journal of Personal Selling and Sales Management, 21*(1), 1-14.
McCrae, R. R., & Costa, P. T., Jr. (1989). The structure of interpersonal traits: Wiggins's circumplex and the five-factor model. *Journal of Personality and Social Psychology, 56*(4), 586-595.
McKnight, D. H., Choudhury, V., & Kacmar, C. (2002). Developing and validating trust measures for e-commerce: An integrative typology. *Information Systems Research, 13*(3), 334-359.
Morry, M. (2005). Relationship satisfaction as a predictor of similarity ratings: A test of the attraction–similarity hypothesis. *Journal of Social and Personal Relationships, 22*(4), 561-584.
Nass, C., Moon, Y., Fogg, B., Reeves, B., & Dryer, D. (1995). Can computer personalities be human personalities? *International Journal of Human-Computer Studies, 43*, 223-239.
Nass, C., Steuer, J., Tauber, E., & Reeder, H. (1993). Anthropomorphism agency and ethopoeia: Computers as social actors. *Proceedings of the Int. CHI Conference*, Amsterdam.
Newcomb, T. (1961). *The acquaintance process*. New York, NY: Holt, Rinehart and Winston.
Norman, W. T. (1963). Toward an adequate taxonomy of personality attributes: Replicated factor structure in peer nomination personality ratings. *Journal of Abnormal and Social Psychology, 66*(6), 574-583.
Pandey, J. (1978). Dependency similarity, attraction and perceived helpfulness. *Social Behavior and Personality, 6*(1), 37-42.

Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, & Computers, 36*(4), 717-731.

Qiu, L., & Benbasat, I. (2005). Online consumer trust and live help interfaces: The effects of text-to-speech voice and three-dimensional avatars. *International Journal of Human-Computer Interaction, 19*(1), 75-94.

Reeves, B., & Nass, C. (1996). *The media equation: How people treat computes, television, and new media like real people and places*. Stanford, CA: CLSI Publication.

Searle, J. R. (1969). *Speech Acts*. New York, NY: Cambridge University Press.

Short, J., Williams, E., & Christie, B. (1976). *The social psychology of telecommunication*. New York, NY: John Wiley and Sons.

Silver, M. S. (1990). Decision support systems: Directed and nondirected change. *Information Systems Research, 1*(1), 47-70.

Sobel, M. E. (1982). Asymptotic intervals for indirect effects in structural equations models. In S. Leinhart (Ed.), *Sociological methodology* (pp. 290-312). San Francisco, CA: Jossey-Bass.

Taylor, S., & Todd, P. A. (1995). Understanding information technology usage - a test of competing models. *Information Systems Research, 6*(2), 144-176.

Venkatesh, V., (2000). Determinants of perceived ease of use: Integrating control, intrinsic motivation, and emotion into the technology acceptance model. *Information Systems Research, 11*(4), 342-365.

Wang, W., & Benbasat, I. (2007). Impact of explanations on trust in and adoption of online recommendation agents. *Journal of Management Information Systems, 23*(4), 219-249.

Wang, W., & Benbasat, I. (2005). Trust in and adoption of online recommendation agents. *Journal of AIS, 6*(3), 72-101.

Werner, C., & Parmelee, P. (1979). Similarity of activity preferences among friends: Those who play together stay together. *Social Psychology Quarterly, 42*(1), 62-66.

Wiggins, J. S., & Pincus, A. L. (1989). Conceptions of personality disorders and dimensions of personality. *Psychological Assessment, 1*(4), 305-316.

Wiggins, J., Trapnell, P., & Phillips, N. (1988). Psychometric and geometric characteristics of the revised interpersonal adjective scales. *Multivariate Behavioral Research, 23*(4), 517-530.

Wixom, B. H., & Todd, P. A. (2005). A theoretical integration of user satisfaction and technology acceptance. *Information Systems Research, 16*(1), 85-102.

Zuckers, L. G. (1986). Similarity based trust. *Research in Organizational Behavior, 8*, 53-111.

Appendices

Appendix A. Experimental Treatment Groups[6]

Personality Treatments

Dominance is marked by behavior that is self-confident, leading, self-assertive, and take-charge. Submissiveness is marked by behavior that is self-doubting, weak, passive, following, and obedient (Wiggins & Pincus, 1989). Dominant individuals tend to try to exercise power over the behaviors of others, to make decisions for others, and to command and direct others to take certain actions (Kiesler, 1983). Submissive individuals, on the other hand, tend to avoid such behavior. In particular, dominance is behaviorally marked by: 1) giving orders, 2) making decisions and talking others into following them, and 3) assuming responsibility. Conversely, submissiveness is behaviorally marked by the following: 1) being easily led, 2) letting others make decisions, and 3) avoiding responsibility (Kiesler, 1983).

In this study, dominance on the part of the shopping assistant was manifested via operationalizing the aforementioned behavioral markers in three different ways:

(1) The use of suggestive guidance (i.e., guidance that proposes specific courses of action, Silver, 19 90, e.g., “A 17" wide-screen is what I recommend”), in addition to the informational guidance (i.e., guidance that provides users with relevant information without indicating how the user should proc eed) also offered by the submissive assistant. This corresponds with the description of dominant i ndividuals as often making decisions for others.

(2) The use of directive speech acts (i.e., speech acts that request the hearer to do something, e.g., “You should choose the 600m model”, Searle, 1969), in addition to the assertive speech acts (i.e., speech acts that inform the hearer of facts or states of nature) used by both assistants. This corre sponds with the description of dominant individuals having the ability to give orders.

(3) The expression of higher confidence levels (e.g. “A TrueLife display will certainly offer a viewing ex perience that is surely more crisp and unquestionably more vivid”) and the use of assertive and ac tion words (e.g., I need you to provide me with your email address”), as opposed to the expressio n of lower confidence levels (e.g., “A TrueLife display may offer a viewing experience that is proba bly more crisp and possibly more vivid”) and the use of timid and unassertive words (e.g., “please provide me with your email”) by the submissive assistant. This corresponds with the description of dominant individuals as self-confident, self-assertive, and leading.

Decision Strategy Treatments

Decision makers have been shown to apply up to 12 different decision strategies when choosing one from a number of alternatives described by a common set of attributes (Bettman et al., 1998). These strategies vary in terms of their level of use of decision heuristics and/or normative rules, where each strategy falls somewhere on a continuum anchored by “completely normative” to “completely heuristic”.

Bettman et al. (1998) identified four primary aspects that characterize each of these decision strategies: 1) the level of the total amount of information processed (extensive or limited), 2) the selectivity in information processing (consistent or selective), 3) the pattern of processing (alternative-based or attribute-based), and 4) whether the strategy is compensatory or non-compensatory. Consequently, each of the 12 decision strategies can be manifested through the use of decision rules that correspond with the four primary characteristics described.

In this study, a normative decision strategy was cued through the following decision rules: (i) using all of the information provided about the importance of each attribute (extensive processing), (ii) assigning importance levels to each attribute and allowing all attributes to factor into the evaluation of each alternative (consistent processing), (iii) evaluating each alternative, one alternative at a time

[6] This description of the experiment is adapted from the one provided in Al-Natour et al. (2006).

(alternative-based processing), and (iv) allowing for low scores on a certain attribute to be compensated by high scores on an equally important attribute (compensatory processing).

On the other hand, a heuristic strategy was cued through the following decision rules: (i) using a subset of the information provided about the importance of each attribute (limited processing), (ii) allowing only some of the product attributes to be used in the evaluation, where different alternatives are evaluated on different sets of attributes depending on the order in which they are evaluated and eliminated (selective processing), (iii) evaluating alternatives one attributes at a time (attribute-based processing), and (iv) discarding some alternatives after considering only some of their attributes, because they didn't meet the cut-off value for a certain attribute (non-compensatory processing).

In this study, an assistant manifesting a normative strategy described its strategy as undergoing extensive and consistent processing, while using alternative-based comparisons and compensation. Alternatively, an assistant manifesting a heuristic strategy described its strategy as undergoing limited and selective processing, without any attribute-based comparisons or compensation. Table 4 provides sample scripts.

Other Treatments

In addition to manipulating dominance and decision strategy, the treatment assistants differed in their gender and whether they communicated through voice or text. The different levels of communication channel modality were programmed using either Active Server Pages (ASP) for text communication, or a commercial Virtual Host service for the voice communication. In the case of voice, an animated avatar representing the shopping assistant read statements using text-to-speech technology. When the assistant communicated through text, the same statements appeared below a still picture of the assistant. A screenshot of the experimental interface is shown in Figure 3. To control for possible gender effects, we manipulated the gender of the assistant both in terms of voice and appearance. To ensure that the face and voice used did not communicate additional unintended dominance or submissiveness cues, we conducted a pre-test to ensure that the shopping assistant's voice and physical representation (i.e., face) used in the final data collection were neutral in terms of their dominance. Six male and four female voice samples were pre-tested, as well as ten potential facial representations of the male and six of the female shopping assistant.

Exhibit A-1. Sample Shopping Assistant Scripts

	Dominant Personality	Submissive Personality
Heuristic Decision Strategy	It is absolutely clear to me that John would surely not want a computer that doesn't come with sufficient warranty. Since the 2200 model does not offer a warranty option, it should be discarded. Since John indicated how he hates it when some sort of power outage interrupts his work, I am certain that he will definitely be unwilling to settle for a laptop computer that comes with a short-life primary battery. As a result, I strongly believe the 6000 model should surely be discarded. The XPS and 9300 models are indeed much heavier and would be tough for John to shuttle around on his long commutes and occasional trips. That's why I think these two models should indeed be discarded. That only leaves the 700m and the 600m models. I strongly believe that either of these two models is perfectly suitable. However, considering John's weak eyesight as well as his desire to use his computer to watch movies, I recommend the 600m since it definitely offers the larger display.	It is somewhat clear to me that John might not want a computer that doesn't come with sufficient warranty. Since the 2200 model does not offer a warranty option, it may be discarded. Since John indicated in his description how he hates it when some sort of power outage interrupts his work, it may be that he will be unwilling to settle for a laptop computer that comes with a short-life primary battery. As a result, the 6000 model may be discarded. The XPS and 9300 models are perhaps much heavier and would be not be easy for John to shuttle around. That's why these two models may be discarded. That only leaves the 700m and the 600m models. I somewhat believe that either of these two models is probably suitable. However, considering John's weak eyesight as well as his desire to use his computer to watch movies, I recommend the 600m since it probably offers the larger display.

Normative Decision Strategy	I am extremely confident that John considers both the laptop's warranty option as well as a CD-RW as must-have attributes, and hence most important. Next, in terms of importance, indeed comes the laptop's primary battery, definitely followed by its weight and the size of its screen, where the last two seem to be of equal importance. Next, surely comes the hard drive, the processor speed, and the amount of memory where all three are certainly of moderate importance. While John is indeed flexible on what Operating System the laptop should have, or what speed its wireless network card should be at, it is evident that John considers the price of the laptop to be of moderately importance. While the 2200 model certainly has the worst warranty, it certainly offers a relatively large display, and comes as a light machine. The 6000 model, while positively offering a reasonable warranty option, an average processor speed and hard drive, a moderate weight, and a fairly large display, is surely plagued by its below average primary battery and its lack of a CD-RW. Both the 600m and the 700m models positively offer an average processor and slightly above average warranty with a good battery and are relatively lightweight, but are definitely the two with the smallest display, while the 600m doesn't even come with a CD-RW. Both the 9300 and the XPS models definitely rank above average in terms of their display size, warranty, battery life, processor speed, amount of memory, and the size of their hard drive, as well as offering a CD-RW, but they are both certainly much heavier and somewhat pricy, as well as offering an Operating System that goes beyond John's needs. When all attributes and their relative importance are considered, it appears that both the 700m and the 600m models are suitable and are the best models on average, with the 600m model having a slight edge. I strongly recommend going with the 600m model.	It seems to me that John considers both the laptop's warranty option as well as a CD-RW as must-have attributes, and perhaps most important. Next, in terms of importance, perhaps comes the laptop's primary battery, probably followed by its weight and the size of its screen, where the last two seem to be of equal importance. Next, may come the hard drive, the processor speed, and the amount of memory where all three are possibly of moderate importance. While John seems to be flexible on what Operating System the laptop should have, or what speed its wireless network card should be at, it is likely that John considers the price of the laptop to be of moderately importance. While the 2200 model may have the worst warranty, it offers a relatively large display, and comes as a light machine. The 6000 model, while perhaps offering a reasonable warranty option, an average processor speed and hard drive, a moderate weight, and a fairly large display, seem to be plagued by its below average primary battery and its lack of a CD-RW. Both the 600m and the 700m models offer an average processor and slightly above average warranty with a good battery and are relatively lightweight, but are definitely the two with the smallest display, while the 600m doesn't even come with a CD-RW. Both the 9300 and the XPS models most likely rank above average in terms of their display size, warranty, battery life, processor speed, amount of memory, and the size of their hard drive, as well as offering a CD-RW, but they are both possibly much heavier and somewhat pricy, as well as offering an Operating System that goes beyond John's needs. When all attributes and their relative importance are considered, it appears that both the 700m and the 600m models are suitable and are the best models on average, with the 600m model having a slight edge. I recommend going with the 600m model.

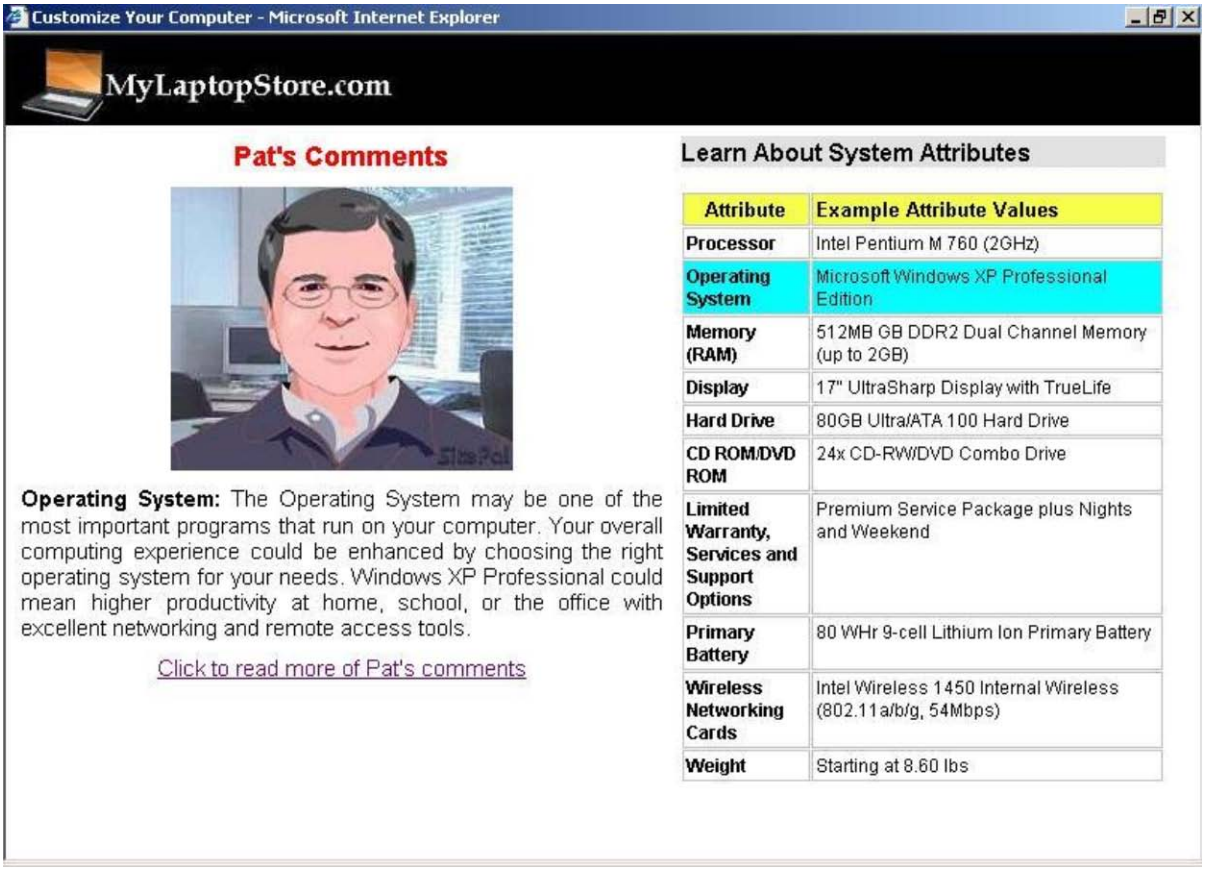

Exhibit A-2. Experimental Treatment Screenshot

Appendix B.

Exhibit B-1. Measurement Items

Item		Mean (Std. dev)	Std. Loading
Perceived Enjoyment (7-point semantic differential scale; Van der Heijden, 2004):			
PE1	Enjoyable – Irritating.	4.82 (1.61)	0.86
PE2	Exciting – Dull.	3.98 (1.40)	0.84
PE3	Pleasant – Unpleasant.	4.85 (1.58)	0.86
PE4	Interesting – Boring.	4.49 (1.70)	0.92
Usefulness (7-point Likert scale, from "strongly disagree" to "strongly agree"; (Davis, 1989; Venkatesh, 2000):			
PU1	Using the shopping assistant enabled me to shop more quickly.	4.15 (1.78)	0.88
PU2	In my opinion, using the shopping assistant increased my shopping effectiveness.	4.58 (1.68)	0.96
PU3	In my opinion, using the shopping assistant increased my shopping efficiency.	4.46 (1.68)	0.95
PU4	Overall, using the shopping assistant was useful for shopping.	4.70 (1.71)	0.95
Perceived Ease of Use (7-point Likert scale, from "strongly disagree" to "strongly agree"; Venkatesh, 2000):			
PEU1	The interaction with the shopping assistant is clear and understandable.	5.41 (1.32)	0.84
PEU2	Interaction with the shopping assistant does not require a lot of mental effort.	5.25 (1.24)	0.76
PEU3	I find the shopping assistant easy to use.	5.48 (1.27)	0.88
PEU4	I find it easy to get the shopping assistant to do what I want it to do.	4.27 (1.59)	0.64
Social Presence (7-point Likert scale, from "strongly disagree" to "strongly agree"; Gefen and Straub, 2003):			
SP1	There is a sense of human contact when interacting with the shopping assistant.	4.04 (1.79)	0.92
SP2	There is a sense of personalness when interacting with the shopping assistant.	3.96 (1.74)	0.90
SP3	There is a sense of sociability when interacting with the shopping assistant.	3.80 (1.71)	0.93
SP4	There is a sense of human warmth when interacting with the shopping assistant.	3.43 (1.63)	0.91
Trust (7-point Likert scale, from "strongly disagree" to "strongly agree"; adapted from the Benevolence-Competence-Integrity trusting beliefs typology, McKnight et al., 2002)**:**			
TR1	I believe this shopping assistant is competent.	5.06 (1.29)	0.83
TR2	I believe this shopping assistant to be benevolent.	3.98 (1.31)	0.76
TR3	I believe this shopping assistant has a high integrity.	4.60 (1.44)	0.92
TR4	Overall, I believe this shopping assistant is trustworthy.	4.71 (1.39)	0.92
Perceived Personality Similarity (7-point Likert scale, *"How similar or different do you think you and the shopping assistant are in terms of"*, from *"very different"* to *"exactly the same"*; adapted from the dominance measure in the IAS-R, Wiggins et al., 1988):			
PS1	Your self-confidence level.	4.86 (1.40)	0.94
PS2	Your self-assurance level.	4.85 (1.37)	0.94
PS3	Your firmness level.	4.63 (1.41)	0.94
PS4	Your persistence level.	4.67 (1.35)	0.91
PS5	Your level of dominance.	4.34 (1.40)	0.88

Item		Mean (Std. dev)	Std. Loading
Perceived Decision Process Similarity (7-point Likert scale, *"How similar or different do you think you and the shopping assistant are in terms of*", from "very different" to "exactly the same"):			
DS1	Your decision making style.	4.32 (1.50)	0.91
DS2	The way you solve choice problems.	4.43 (1.41)	0.94
DS3	How you arrived at a decision of which laptop to pick.	4.33 (1.61)	0.90
Product Knowledge (7-point Likert scale, ranging from "strongly disagree" to "strongly agree"):			
PK1	I consider myself to be an expert in choosing computers.	3.62 (1.71)	0.94
PK2	I consider myself to be an expert in computer parts.	3.40 (1.73)	0.94
PK3	I am knowledgeable about computers.	5.06 (1.42)	0.87
PK4	I have extensive experience in buying computer.	3.87 (1.69)	0.91
Personality-Dominance (7-point Likert scale, from "strongly disagree" to "strongly agree"; Wiggins et al., 1988). ***Cronbach's Alpha:*** *0.81 (assistant), 0.87 (user).*			
PD1	Dominant	3.77 (1.23) [4.01 (1.43)]*	0.87 [0.86]
PD2	Assertive	4.38 (1.26) [4.50 (1.32)]	0.77 [0.79]
PD3	Domineering	3.35 (1.25) [3.45 (1.39)]	0.88 [0.80]
PD4	Forceful	3.41 (1.26) [3.73 (1.42)]	0.88 [0.83]
PD5	Self-confident	dropped	
PD6	Self-assured	dropped	
PD7	Firm	4.66 (1.23) [4.70 (1.25)]	0.77 [0.75]
PD8	Persistent	4.12 (1.26) [5.06 (1.37)]	0.80 [0.61]
Decision Strategy (7-point Likert scale, from "strongly disagree" to "strongly agree"; based on Bettman et al., 1998). ***Cronbach's Alpha:*** *0.91 (assistant), 0.75 (user).*			
DS1	All laptop attributes factored into the shopping assistant's (my) decision.	5.02 (1.62) [5.69 (1.35)]*	0.72 [0.65]
DS2	All of the information provided by John about the importance of each attribute was used to derive the shopping assistant's (my) final choice.	5.15 (1.56) [5.89 (1.28)]	0.65 [0.65]
DS3	The shopping assistant (I) did not discard a model that was rated low on a certain attribute, if it was rated very high on an equally important attribute.	4.40 (1.65) [4.67 (1.60)]	0.72 [0.63]
DS4	Only some of the laptop attributes were used to arrive at the assistant's (my) choice [R]**.	3.92 (1.82) [4.71 (1.75)]	0.77 [0.70]
DS5	The assistant (I) discarded some models after it (I) considered only some of their attributes [R].	3.44 (1.67) [3.48 (1.80)]	0.81 [0.73]
DS6	The assistant (I) discarded some models primarily because they didn't meet the cutoff value for a certain attribute(s) [R].	3.31 (1.56) [3.00 (1.58)]	0.62 [0.65]

* Values are shown separately for the scales used to measure the assistant's and the user's decision strategies. The values from the user scale are shown in brackets.
** Reversed-coded items.

Appendix C.

Exhibit C-1. Construct-Item Correlations

	PE	PU	PEU	SP	TR	DS	PS	PK
PE1	0.86	0.81	0.59	0.63	0.63	0.44	0.23	-0.19
PE2	0.84	0.62	0.39	0.65	0.49	0.28	0.21	-0.12
PE3	0.86	0.59	0.51	0.50	0.51	0.34	0.22	-0.14
PE4	0.92	0.66	0.53	0.57	0.52	0.36	0.26	-0.12
PU1	0.66	0.88	0.50	0.63	0.56	0.40	0.16	-0.26
PU2	0.76	0.96	0.56	0.64	0.64	0.48	0.20	-0.30
PU3	0.69	0.95	0.53	0.59	0.62	0.47	0.22	-0.31
PU4	0.76	0.95	0.57	0.63	0.64	0.45	0.19	-0.29
PEU1	0.54	0.54	0.84	0.52	0.49	0.31	0.13	-0.15
PEU2	0.30	0.21	0.76	0.24	0.28	0.22	0.22	0.02
PEU3	0.56	0.56	0.88	0.48	0.52	0.45	0.34	-0.12
PEU4	0.42	0.50	0.64	0.53	0.48	0.29	0.25	-0.11
SP1	0.65	0.65	0.52	0.92	0.57	0.39	0.17	-0.14
SP2	0.63	0.67	0.53	0.90	0.60	0.48	0.23	-0.16
SP3	0.62	0.57	0.56	0.93	0.60	0.38	0.24	-0.09
SP4	0.59	0.57	0.48	0.91	0.55	0.29	0.13	-0.10
SP5	0.59	0.58	0.46	0.91	0.55	0.31	0.17	-0.16
TR1	0.67	0.73	0.63	0.57	0.83	0.47	0.32	-0.12
TR2	0.36	0.33	0.31	0.40	0.76	0.19	0.21	-0.09
TR3	0.52	0.55	0.44	0.59	0.92	0.36	0.28	-0.16
TR4	0.58	0.64	0.55	0.59	0.92	0.42	0.23	-0.19
DS1	0.42	0.49	0.38	0.38	0.44	0.91	0.49	0.00
DS2	0.38	0.45	0.41	0.42	0.39	0.94	0.55	-0.04
DS3	0.31	0.39	0.34	0.30	0.33	0.90	0.47	-0.03
PS1	0.25	0.20	0.29	0.21	0.27	0.52	0.94	0.20
PS2	0.26	0.19	0.28	0.22	0.32	0.54	0.94	0.18
PS3	0.30	0.23	0.32	0.20	0.33	0.51	0.94	0.15
PS4	0.22	0.19	0.27	0.19	0.27	0.52	0.91	0.15
PS6	0.20	0.14	0.20	0.13	0.22	0.46	0.88	0.14
PK1	-0.15	-0.30	-0.10	-0.13	-0.12	-0.07	0.15	0.94
PK2	-0.14	-0.29	-0.15	-0.14	-0.16	-0.02	0.17	0.94
PK3	-0.14	-0.28	-0.07	-0.11	-0.17	-0.02	0.19	0.87
PK4	-0.17	-0.28	-0.11	-0.15	-0.16	0.02	0.15	0.91

PE: Perceived Enjoyment
PU: Perceived Usefulness
PEU: Perceived Ease of Use
SP: Social Presence
TR: Trust
DS: Perceived Decision Process Similarity
PS: Perceived Personality Similarity
PK: Product Knowledge

About the Authors

Sameh AL-NATOUR is a Ph.D. student in Management Information Systems at the Sauder School of Business in Canada, and currently holds an academic position at the American University of Sharjah in the UAE. He obtained a M.Sc. from the University of British Columbia, and an M.B.A and a B.S from Simon Fraser University. His research focuses on the design and evaluation of human-computer interfaces, e-commerce, and the adoption and use of information technology.

Izak BENBASAT is a Fellow of the Royal Society of Canada and CANADA Research Chair in Information Technology Management at the Sauder School of Business, University of British Columbia, Canada. He currently serves on the editorial boards of *Journal Management Information Systems* and *Information Systems Journal.* He was editor-in-chief of *Information Systems Research*, editor of the Information Systems and Decision Support Systems Department of *Management Science*, and a senior editor of *MIS Quarterly*. He became a Fellow of the Association for Information Systems (AIS) in 2002, received the LEO Award for Lifetime Exceptional Achievements in Information Systems from AIS in 2007, and was conferred the title of Distinguished Fellow by the Institute for Operations Research and Management Sciences (INFORMS) Information Systems Society in 2009.

Ronald T. CENFETELLI is an assistant professor of Management Information Systems at the University of British Columbia's Sauder School of Business. He holds a Ph.D. from the University of British Columbia, an M.B.A. from Indiana University, and a B.S. in engineering from Purdue University. Ron's research interests include e-business, the behavioral and emotional aspects of technology usage, the role of technology in influencing immoral behavior, and structural equation modeling. Ron has prior careers as a United States naval officer and as a manager in the pharmaceutical industry.